

IPRL Offshoots

USDA-ARS Invasive Plant Research Laboratory
3205 College Ave., Fort Lauderdale, FL 33314



June/July 2004



Upcoming Events

44th Annual Meeting of the
Aquatic Plant Management
Society

July 11-14, 2004

Tampa, Florida

www.apms.org

Florida Entomological Society
Annual meeting

July 25 – 28, 2004

Radisson Bahia Mar Beach Resort

801 Seabreeze Blvd.,

Fort Lauderdale, FL 33316

[http://www.flaentsoc.org/
annual.htm](http://www.flaentsoc.org/annual.htm)

89th Annual Meeting of the
Ecological Society of America
August 1-6, 2004

Portland, Oregon

www.esa.org/portland/

More upcoming events on page 9

South Florida is not the only location outside of Australia that is having problems with melaleuca invasions. In the United States, melaleuca has taken root in Louisiana, Texas, California, Hawaii, and Puerto Rico (the subject of this report). Elsewhere, it occurs as an exotic in Costa Rica and Japan, as well as many islands in the Pacific and might be hiding in other places.

One of the tasks of the TAME Melaleuca project is to identify locations where melaleuca is located, determine the extent of its presence and transfer the information to other countries to aid in their struggles to control this species. Dr. Paul Pratt, director of the TAME Melaleuca project, has taken several trips to Puerto Rico to assist the scientists there with assessing their melaleuca situation.

John Scoles - Editor

Melaleuca Invades Puerto Rican Wetlands

Melaleuca (*Melaleuca quinquenervia*) has been globally dispersed over the course of the last century for use as an ornamental plant, to re-vegetate cleared areas, and for forestation. It was introduced in the continental United States to California, Texas, and Louisiana, but it was most widely planted in Florida. While not known to be invasive elsewhere, melaleuca has proven to be a superior competitor to native vegetation occurring in wetlands of the Florida Everglades. After its introduction, melaleuca spread at an estimated rate of over 7,000 acres per year and the weed now dominates over 494,000 acres of Everglades ecosystems. These melaleuca wetland forests typically form dense monocultures characterized by continuous upper canopies with sparse understories.

Melaleuca has also been planted widely as an ornamental on the Caribbean island of Puerto Rico.

When considering this tree's invasive nature in Florida, the abundance of wetland habitats, and its extensive use as an ornamental, it should not be surprising that the tree is also invading natural areas of Puerto Rico. Recent research done by Dr. Paul Pratt of the IPRL, in collaboration with scientists from the Puerto Rico Department of Natural Resources, addresses the extent of the melaleuca naturalization in Puerto Rico and possible methods of averting a landscape level invasion on the island.

Earliest known records concerning the planting of melaleuca in Puerto Rico date back to the first quarter of the twentieth century under the botanical synonym *Melaleuca leucadendron*. Further study uncovered reports and collection records documenting ornamental plantings of melaleuca within San Juan from the 1930s through the 1950s. In 1960, the Agricultural Extension Service of the University of Puerto Rico included melaleuca in a list of appropriate ornamental trees for small tracts of land and the tree was identified as highly tolerant to wet soils, dry periods, strong winds and some degree of salt intrusion. Demand for the tree in urban landscaping increased substantially island-wide throughout the 1980 and 90s, resulting in plantings of the tree in public parks along certain highway medians and green areas.

Naturalized melaleuca populations were discovered at five locations on the island, primarily in the northern regions, of which three were investigated for this report. Like most areas of the Caribbean, the climate in this region is humid and warm.

Two naturalized stands of melaleuca have invaded the Tortuguero Lagoon Basin wetlands, with additional scattered single trees dispersed in the vicinity of the primary stands. The first stand has invaded areas in the southern portions of the



Vincente Quevedo, Paul Pratt, and Eileen Ortiz, at the Tortuguero site 1

Photo by Lourdes Bernier

Puerto Rico Quick Facts:

Location:

Caribbean, island between the Caribbean Sea and the North Atlantic Ocean, east of the Dominican Republic

Geographic coordinates:

18° 15' North
66° 30' West

Map references:

Central America and the Caribbean

**Puerto Rico
Quick Facts:**

Area:

total: 3,515 square miles

water: 56 square miles

land: 3,459 square miles

Area - comparative:

slightly less than three times the size of Rhode Island

Land boundaries:

None

Coastline: 311 miles

Tortuguero Lagoon Natural Reserve and the second occurs near the north eastern boundary of the reserve, south of the town of Vega Baja. In the past, this wetland was partially drained, a series of irrigation canals were dredged, and the organically rich soils were farmed. Although the abandoned irrigation canals remain, restoration efforts have returned the area to a permanently flooded wetland.

The first melaleuca stand, consisting of about 20 trees, was originally discovered in 1995 by Vicente Quevedo of the Puerto Rican Department of Natural Resources. Shortly after the discovery, land managers cut down the trees near the soil level. The outcome of the cutting was stump regrowth and limited sprouting of seedlings.

The second, larger melaleuca population has invaded over 3 acres of the sawgrass dominated wetlands. The stand is predominantly widely dispersed mature trees. While the site was dominated by melaleuca, other tree species also occurred within the stand, including Australian pine and native ficus trees.



Jamie Pabon poses with dense melaleuca saplings at Suarez Canal.

Photo by Dr. Paul Pratt

The third melaleuca population has invaded the San Juan Bay Estuary wetland, near the city of Carolina. This wetland drains into the Suarez Canal, which forms part of the San Juan Bay Estuary watershed. The site was once farmed, as indicated by existing canals, and is currently characterized by organic soils and a short wet period (flooded less than three months per year). Melaleuca was the dominant tree.

Strategies for controlling invasive weeds often include early detection of newly forming populations, timely use of appropriate control measures and continued monitoring after treatment. As described above, the time since establishment and the extent of melaleuca invasion is limited in Puerto Rico. In addition, multiple control tactics are available to combat the invasive tree, with varying levels of efficacy and appropriateness.

Melaleuca is a fire-adapted species and therefore prescribed burns are not appropriate as multiple recent wildfires have had little apparent impact on the melaleuca population at Tortuguero Lagoon basin sites and are likely aiding the prolific sprouting of seeds at the San Juan Bay Estuary site.

Flooding has not proven an effective tool for suppressing existing melaleuca trees. Mature and sapling trees have the ability to withstand prolonged flooding. However, maintaining or increasing high water levels might play an important role in limiting seed sprouting. While maintaining extremely long periods of high water might reduce the numbers of seeds germinating, this change in natural areas might also adversely affect native plants and animals.

The most effective approach for managing melaleuca, which produces the most rapid results, is the use of herbicides. Two commonly used approaches for removing large individual trees involve girdling the trunks and applying an herbicide into the injury, and felling trees and treating the stumps. Herbicide is applied directly onto the exposed cambial layer of girdled trees, resulting in mortality of the above and below ground portions of the tree. Stumps of fallen melaleuca trees quickly regrow if left untreated and cut stems must be suspended above the water level to avoid developing unintended roots.

Felling trees and manual removal of seedlings and small saplings are the only forms of mechanical control that are currently recommended for use in natural areas of South Florida. Although time consuming, hand removal of saplings can be an effective method of controlling seedlings and saplings of less than three feet in height. Mechanically removing melaleuca using heavy equipment often results in unacceptable levels of collateral damage to native vegetation and soil systems. However, heavy equipment works well in accessible

Puerto Rico Quick Facts:

Maritime claims:
exclusive economic zone: 200 nautical miles
territorial sea: 12 nautical miles

Climate:
tropical marine, mild;
little seasonal temperature variation

Terrain:
mostly mountains, with coastal plain belt in north; mountains precipitous to sea on west coast; sandy beaches along most coastal areas



Hack and squirt treatment used on melaleuca

Photo by Paul Pratt

**Puerto Rico
Quick Facts:**

Elevation extremes:

lowest point:

Caribbean Sea 0 feet

highest point: Cerro

de Punta 4,390 feet

Natural resources:

some copper and
nickel; potential for
onshore and offshore
oil

Land use:

arable land: 3.72%

permanent crops:

5.07%

other: 91.21% (1998
est.)

areas, such as along canals, utility rights-of-way, and in new developments.

Classical weed biological control involves reuniting an invasive plant with certain natural enemies from its native range. The introduction of two specialized insects has been demonstrated as an effective method of controlling melaleuca in Florida. The first candidate selected was the melaleuca weevil *Oxyops vitiosa*. The second insect introduced was the melaleuca psyllid, *Boreioglycaspis melaleucae*. It was released in South Florida in 2002. Psyllid adults and nymphs both feed on expanding buds and leaves but as competition for these sites increase, nymphs also exploit mature, fully expanded leaves. Preliminary data have shown that feeding by psyllids results in a 60% mortality of seedlings within three generations of the insect (less than six months.)

The feasibility of using a biological control program for melaleuca in Puerto Rico is dependent, in part, on two factors:

- the host specificity of the existing biological control agents in relation to the island's flora and
- conflicts of interest inherent in targeting ornamentally planted melaleuca trees.

The biological control agents approved for introduction into Florida have not been evaluated as to their tendency to attack Myrtaceae of Puerto Rico and the Virgin Islands. These species, as well as representatives from the other native Myrtaceae and closely related economically important flora, must be evaluated prior to requesting permission to introduce the insects into Puerto Rico.

After release, biological control agents attack ornamental plantings and invasive weed populations alike. While controlling ornamental trees will limit further invasion of environmentally sensitive wetlands, the public might object to the damage caused to their trees. Therefore,



*Mature melaleuca at the
Tortuguero site 2.*

Photo by Paul Pratt

conflicts of interest between the issues of halting further invasion of wetlands and maintaining ornamental plantings must be addressed prior to using a biological control program for melaleuca in Puerto Rico.

In Florida, it was determined that an integration of all available control techniques is required to effectively remove melaleuca from natural areas. The overall philosophy of integrated control methods is to suppress invasive weeds through a combination of biological, physical, and chemical methods that reduce pest populations to acceptable levels while minimizing impacts on the environment. This strategy, however, was developed while realizing that melaleuca was widely distributed over vast natural areas that were difficult to access making eradication unfeasible. In contrast, the geographic distribution of melaleuca in Puerto Rico is limited, so cost-effective herbicides can halt existing invasions.

When considering its broad use as an ornamental plant, it is doubtful that naturalization and invasion of melaleuca is limited to Puerto Rico and Florida. Ornamental plantings also occur on St. John in the Virgin Islands; the Dominican Republic; San José, Costa Rica; and in anecdotal reports from the Zapata Peninsula in Cuba as well as Cuernavaca, Mexico. It remains unclear, however, if melaleuca is spreading beyond these intentional plantings into nearby environmentally sensitive lands of the West Indies and Central America.



Lourdes Bernier at Canal Suarez.

Photo by Paul Pratt.

Puerto Rico Quick Facts:

Irrigated land:
154 square miles
(1998 est.)

Natural hazards:
periodic droughts;
hurricanes

**Environment -
current issues:**
erosion; occasional
drought causing water
shortages

**Puerto Rico
Quick Facts:**

Geography - note:
important location along the Mona Passage - a key shipping lane to the Panama Canal; San Juan is one of the biggest and best natural harbors in the Caribbean; many small rivers and high central mountains ensure land is well watered; south coast relatively dry; fertile coastal plain belt in north

Agricultural products:
sugarcane, coffee, pineapples, plantains, bananas; livestock products, chickens

Quick Facts were taken from the CIA World Factbook, January, 2004.

IPRL Loses Three and Gains Two

During June and July the IPRL said goodbye to three fine staffers. Two Student Conservation Association (SCA) interns, Melissa Martin and Lisa Brutcher have gone off to graduate school. One Student Temporary Employment Program (STEP) intern, Jennifer Palacio, left in June to pursue other interests.

Melissa Martin spent two years at the lab working on salvinia and melaleuca projects with Dr. Phil Tipping. She has a bachelor of science degree in Environmental Science from the University of Notre Dame and is leaving us to attend graduate school at the University of Florida where she will pursue a masters degree from the school of soil and water conservation.

Lisa Brutcher is off to Oregon State University to pursue a Ph.D. in Crop and Soil Science. She spent a year and five months at the IPRL working for Paul Madeira on soil microbial density studies. Lisa received her bachelor of science degree in Plant Biology and Urban Horticulture from the University of Arizona.

Jennifer Palacio worked at the IPRL as a technician for about a year and has now gone to train as an Emergency Medical Technician (EMT.) While she was here she worked for Dr. Ted Center.

Everyone at the lab wishes them a fond farewell. Good Luck, Melissa, Lisa and Jennifer!

Two new SCA interns joined the staff in July. Ryan Pierce graduated from Clemson University with a bachelor of science degree in Biology and now wishes to put all his knowledge to work. He has replaced Melissa Martin, working with Dr. Phil Tipping. Ryan plans a one-year stint at the IPRL.

Ian Thomas also joined the staff in July. Ian graduated from Rollins College with a bachelor of arts degree in Biology and will work for Dr. Ted Center. He will be with the IPRL of one year.

Welcome, Ryan and Ian!

Web Sites You May Want to Visit

To learn more about invasive plants and what various organizations are doing about them, visit the following sites on the internet.

Agricultural Research Service
www.ars.usda.gov/

Center for Exotic and Invasive Plants
plants.ifas.ufl.edu

Federal Noxious Weed Program
www.aphis.usda.gov/ppq/weeds

Florida Department of Agriculture,
Department of Plant Industry
www.doacs.state.fl.us/~pi/index.html

Florida Department of Environmental Protection,
Bureau of Invasive Plant Management
www.dep.state.fl.us/lands/invaspec/

Florida Exotic Pest Plant Council
www.fleppc.org

Invasive Plant Research Laboratory
www.weedbiocontrol.org/

The National Agricultural Library's Invasive
Species website
www.invasivespecies.gov

National Noxious Weed Program
<http://dogwood.itc.nrcs.usda.gov/weeds>

South Florida Water Management District
www.sfwmd.gov

Southwest Florida Water Management District
www.swfwmd.state.fl.us/

TAME Melaleuca Project
<http://tame.ifas.ufl.edu>

The Nature Conservancy
<http://nature.org/>



Picture of the Month

A good example of why melaleuca is called the "paper-bark" tree. The photo was taken at the Tortuguero Lagoon Basin in Puerto Rico.

Photo by Paul Pratt



***Here is another example.
This shot was taken in
South Florida.***

Dr. Ted Center
Research Leader
tccenter@saa.ars.usda.gov

Scientists

Dr. Ted Center
tccenter@saa.ars.usda.gov

Dr. Steve Franks
sfranks@saa.ars.usda.gov

Dr. Robert Pemberton
bobbem@saa.ars.usda.gov

Dr. Paul Pratt
prattp@saa.ars.usda.gov

Dr. Min Rayamajhi
minray@saa.ars.usda.gov

Dr. Philip Tipping
ptipping@saa.ars.usda.gov

Dr. Thai Van
thaivan@saa.ars.usda.gov

Dr. Greg Wheeler
wheeler@saa.ars.usda.gov

Support Scientists

Dr. F. Allen Dray
fadray@saa.ars.usda.gov

Paul Madeira
ptmadeira@saa.ars.usda.gov

Cressida Silvers
csilvers@saa.ars.usda.gov

Chris Bennet
cabenn@gvn.ifas.ufl.edu

Susan Wineriter
tmozart@nersp.nerdc.ufl.edu

IPRL Offshoots Editor

John Scoles
jscoles@saa.ars.usda.gov

Technicians

Carl Belnavis
Robyn Chiarelli
Willey Durden
Luke Kasarjian
Jorge Leidi
Rosa Leidi-Ferrer
Kelly MacDonald
Reynaldo Moscat
Eileen Pokorny

Administrative Staff

Geri Barber
gbarber@saa.ars.usda.gov

Sue Keusch
skeusch@saa.ars.usda.gov

***Student Conservation
Association (SCA)
Interns***

Lisa Brucher
Chris Greishop
Melissa Martin
Shannon Morath
Ryan Pierce
Scott Wiggers

***Student Temporary
Employment Program
(STEP)***

Donna Ban
Sigfredo Gonzalez
Jenna Scheidegger

More upcoming events

8th Conference of the International
Society for Plant Anaerobiosis
(ISPA).

September 20-24, 2004

School of Plant Biology, University
of Western Australia
Perth, Western Australia

[http://www.ibba.cnr.it/ispa/
8th_conference/index.html](http://www.ibba.cnr.it/ispa/8th_conference/index.html)

28TH Annual Florida Aquatic Plant
Management Society Training
Conference

Oct 17-20, 2004

Deerfield Beach, FL 33441

[www.homestead.com/fapms/
meeting.html](http://www.homestead.com/fapms/meeting.html)

31st Annual Natural Areas
Conference

October 13-16, 2004

Holiday Inn Mart Plaza
Chicago, IL

24th International Symposium of
the North American Lake
Management Society

November 3-5, 2004

Victoria Conference Centre
Victoria, British Columbia

[http://www.nalms.org/symposia/
symposia.htm](http://www.nalms.org/symposia/symposia.htm)

USDA-ARS/IPRL
3205 College Ave.,
Fort Lauderdale, FL 33314
Tel: 954-475-0541
Fax: 954-476-9169





The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, sex, religion, age, disability, political beliefs, sexual orientation, or marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotope, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Office of Civil Rights, Room 326-W, Whitten Building, 1400 Independence Avenue, SW, Washington, D.C. 20250-9410 or call (202) 720-5964 (voice and TDD). USDA is an equal opportunity provider and employer.

Previous reports are available online at:
<http://tame.ifas.ufl.edu/html/publications.htm>

IPRL Offshoots

USDA-ARS/IPRL
3205 College Ave.,
Fort Lauderdale, FL 33314
Tel: 954-475-0541
Fax: 954-476-9169

